

**NEW AND RARE SPECIES OF
PHYLLOPHAGA (S. STR.) FROM MEXICO
(COLEOPTERA: MELOLONTHIDAE, MELOLONTHINAE)**

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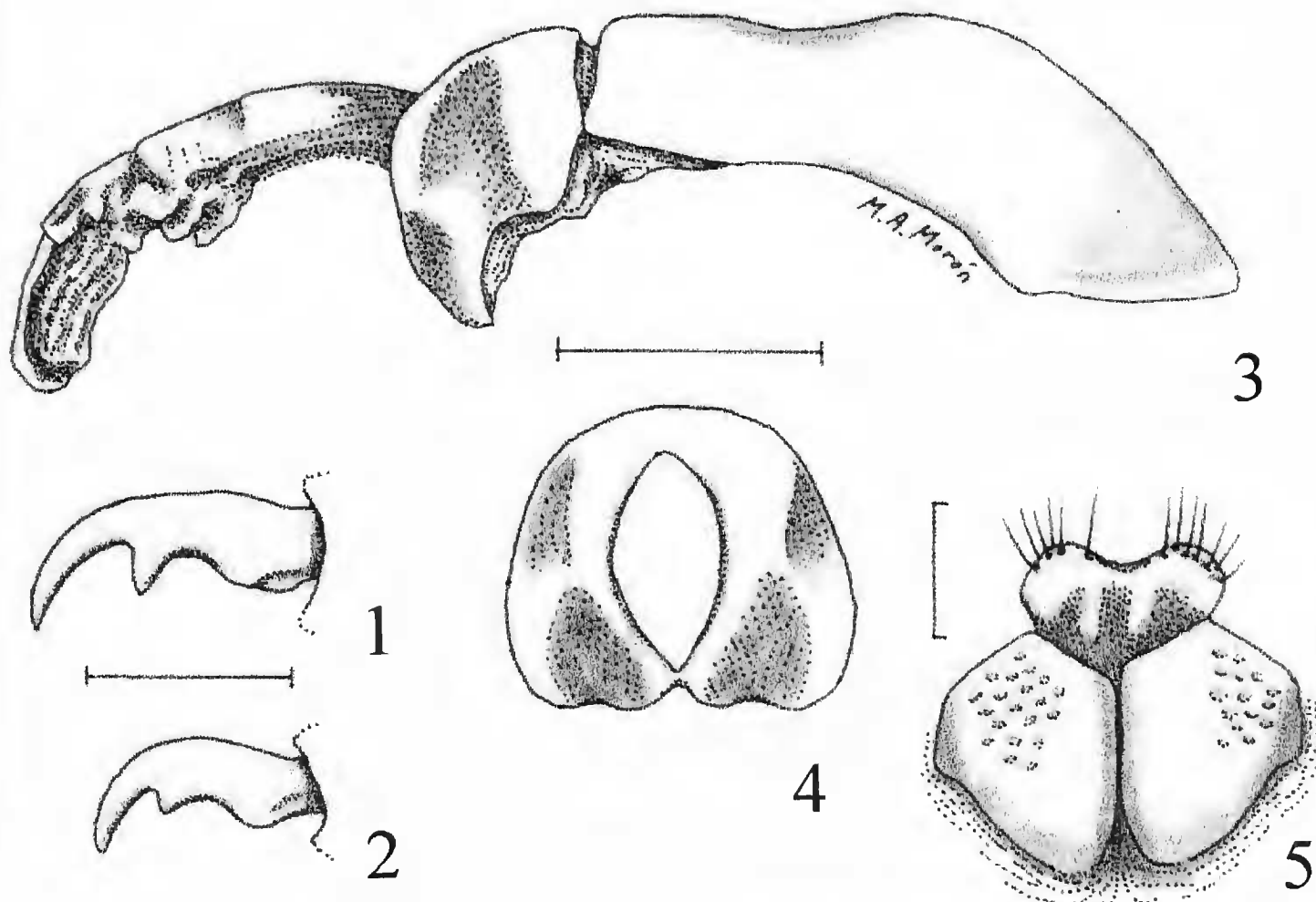
Abstract.—Seven new species of *Phyllophaga* (*s.str.*) are described from Mexican localities as follows: *P. cahitana* NEW SPECIES, from subtropical lowlands of northern Sinaloa; *P. quetzala* NEW SPECIES and *P. regiomontana* NEW SPECIES from pine-oak forests of Nuevo León and Tamaulipas; *P. quetzaloides* NEW SPECIES from temperate montane forests of northwestern San Luis Potosí; *P. stzotzilana* NEW SPECIES from deciduous tropical forests of northwestern Chiapas; *P. tsajumiana* NEW SPECIES and *P. papaloana* NEW SPECIES from pine-oak forests of northern Oaxaca. *Phyllophaga pilula* (Moser) and *P. nisuens* Saylor, previously known only by unique type specimens are redescribed with specimens collected in Chiapas and Oaxaca, respectively. Drawings of male genital capsules, and tarsal claws are provided.

Key Words.—Insecta, May beetles, *Phyllophaga*, taxonomy, Mexico.

Resumen.—Se describen siete especies nuevas de *Phyllophaga* (*s. str.*) procedentes de seis localidades mexicanas: *P. cahitana* NUEVA ESPECIE de las tierras bajas del norte de Sinaloa, *P. quetzala* NUEVA ESPECIE y *P. regiomontana* NUEVA ESPECIE de los bosques de pino-encino del oeste de Nuevo León y Tamaulipas; *P. quetzaloides* NUEVA ESPECIE de los bosques de montaña al noroeste de San Luis Potosí; *P. stzotzilana* NUEVA ESPECIE del bosque tropical caducifolio del noroeste de Chiapas; *P. tsajumiana* NUEVA ESPECIE y *P. papaloana* NUEVA ESPECIE de los bosques de pino y encino del norte de Oaxaca. Con base en ejemplares recolectados en Chiapas y Oaxaca se describen *Phyllophaga pilula* (Moser) y *P. nisuens* Saylor, previamente solo conocidas por ejemplares tipo únicos. Se incluyen ilustraciones de las cápsulas genitales masculinas y de las uñas tarsales de todas las especies citadas.

Curatorial work of *Phyllophaga* specimens from Mexico, deposited in Canadian or United States collections, as well as from recent collection trips to poorly known localities in northwestern and southeastern regions of that country, provided specimens of many undescribed or little known species. Many of these possess diagnostic sets of external characters and male genital capsules that are very different from the known groups of species proposed by Morón (1986). Some of these may be arranged in future new groups of species, but others remain isolated, with uncertain position in the subgenus *Phyllophaga* (*s. str.*). Because many of these species are rare or scarce, it seems more appropriate to describe the new species, and redescribe the rare species while the new groups are configured. This paper gives descriptions of males and some females of seven new species of *Phyllophaga* (*s. str.*), and redescriptions and distributions of two species previously known only by unique type specimens. The characters and terms used in the descriptions are those of Sanderson (1958) and Morón (1986). Drawings were made with the aid of a camera lucida and Leica stereomicroscope and measurements were obtained with ocular micrometer or caliper.

Depository Abbreviations.—American Museum of Natural History, New York (AMNH); California Academy of Sciences, San Francisco (CASC); Canadian National Collection, Ottawa (CNC); Colegio de la Frontera Sur, San Cristóbal de Las Casas, Chiapas, México (ECOSUR); Instituto de Ecología, Xalapa, México



Figures 1–5. *Phyllophaga (s.str.) cahitana* Morón.

Figure 1. Male protarsal claw.

Figure 2. Female protarsal claw.

Figure 3. Male genital capsule, lateral view.

Figure 4. Paramera, distal view.

Figure 5. Female genital plates, ventral view. Scale lines: Figs. 1–2, 5 = 0.5 mm; Figs. 3–4 = 1 mm.

(IEXA); Los Angeles County Museum of Natural History, California (LACM); The Natural History Museum, London (BMNH); University of Nebraska State Museum, Lincoln, Nebraska (UNSM); Zoologisches Museum, Humboldt Universität zu Berlin, Germany (ZMHU); H. & A. Howden/Canadian Museum of Nature, Ottawa (HAHC); G. Nogueira, Guadalajara, México (GNGC) and M.A. Morón, Xalapa, México (MXAL).

PHYLLOPHAGA (PHYLLOPHAGA) CAHITANA MORÓN, NEW SPECIES

(Figs. 1–5)

Types.—(Described from 6 males and 5 females). Holotype, male; MEXICO. SINALOA: Los Mochis, 19 July 1960, W.W. Gibson; deposited: Canadian National Collection, Ottawa. Allotype, female; same data as holotype deposited: M.A. Morón collection, Xalapa. Paratypes: same data as holotype (4 females) (CNC); Sinaloa, Los Mochis, 29 August 1997, G. Nogueira (2 males) (MXAL); Sonora: Ciudad Obregón, 14 July 1960, W.W. Gibson (1 male) (HAHC); Obregón, 29 July 1952, C. & P. Vaurie (1 male) (AMNH); same data except 3 August 1952 (1 male) (AMNH).

Holotype.—Male. Head reddish brown, pronotum, elytra, sterna, pygidium and legs yellowish brown, with silky luster. Clypeus wider than long (3.1:1), anterior border widely sinuated with margins

moderately elevated, surface slightly convex, with many shallow, circular punctures, without setae. Fronto-clypeal suture clearly sinuated and finely impressed. Frons wider than long (1.7:1) convex, densely punctate, without setae. Antenna 10 segmented, with 3 segmented club; lamellae 1.3× longer than the six preceding segments combined, segments 4° or 5° as long as segment 3, segments 6° and 7° wider than long, with acute process directed forward. Frons 4.4× wider than each eye dorsal diameter. Canthus narrowed, curved and rounded, with 6 short setae. Labrum deeply bilobed, with scattered setae on the borders. Mentum widely concave, polished, with scarce setae, anterior border briefly notched. Pronotum wider than long (1.6:1) and 2.3× wider than frons. Pronotal disk with round, shallow punctures regularly dispersed, separated by 1–3 diameters, without setae; lateral borders widely angulated, marginal bead fine and irregularly crenulate, with scarce, short setae; anterior angles obtuse, slightly pointed out; posterior angles obtuse, pointed out. Scutellum 1.4× wider than long, with 10 shallow, small punctures. Elytron 2.2× longer than wide, densely punctate, without macroscopic setae; epipleural border narrowed, extended along the complete margin, with scattered, minute setae; humeral calla rounded, prominent; apical calla rounded, diffuse. Metathoracic wings completely developed. Propygidium with silky luster, fine and sparsely punctate, without setae. Pygidium slightly convex, with silky luster, sparse and shallowly punctate, glabrous; apical margin with 10 short setae; basal margin effaced from side to side. Pterosternum with scarce, short, yellowish vestiture. Visible abdominal sternites 2° to 4° convex at the midline with scattered, short setae, sternite 5° convex, with some short setae at the midline; anal plate shortened, slightly convex, with some, small punctures, and anterior border slightly thickened, with 6 scattered setae near the posterior border. Protibiae shorter than protarsi (0.8:1), with two big teeth and one small tooth on external border, preapical spur long, straight, acute, shorter than 2° protarsomerus. Mesotibiae with one oblique, strong, setiferous, transverse carina across external side, and one point with 2 short spines along dorsal border; upper apical spur nearly straight, narrow, 1.2× longer than lower spur. Metatibiae nearly as long as metatarsi (0.9:1), with one oblique, strong setiferous transverse carina across external side, and one point with 2 short spines along dorsal border; apical spurs articulated with border, upper spur curved, with rounded apex, slightly shorter than 2° metatarsomerus, and 1.1× longer than lower spur. Tarsomeres semicylindrical, elongated, with enlarged apex, some setae around the apex and two irregular lines of some setae ventrally. Tarsal claws symmetrical, similar on all legs, with short teeth located near the middle of ventral border (Fig. 1).

Genital capsule with short, wide paramera, fused at their basis, distal half widened and slightly compressed, with apex briefly sinuated and nearly fused toward mid-line. Tectum convex. Aedeagus long, with sclerotized narrow, tube-like support (Figs. 3–4). Length of genital capsule from the apex of parameres to the border of basal piece: 2.6 mm. Total body length: 7.2 mm. Humeral width: 4.8 mm.

Allotype.—Female. Similar to the male except as follows: antennal club as long as the preceding five segments; distal half of elytra more rounded; pygidial shape more triangular, disk less convex; visible abdominal sternite 5° convex, with scattered setiferous punctures; anal plate convex, shallowly punctate, with 8 short setae near the posterior border. All tarsi shorter than tibiae. Apical spurs of metatibiae more wide and curved than in male, with rounded apex. Tarsal claws with small teeth located before the middle of ventral border (Fig. 2). Ventral genital plates strongly sclerotized, nearly symmetrical, convex, with shallow punctures toward the sides, without setae; dorsal genital plates fused, with wide, rounded distal borders provided with 6–7 setae on each side (Fig. 5). Total body length: 11.2 mm. Humeral width: 5.1 mm.

Type Locality.—Between Los Mochis, state of Sinaloa and Ciudad Obregón, state of Sonora, México (25°47'–27°29' N; 109°0'–109°57' W).

Variation.—Male paratypes are similar to the holotype except as follows: body color dark reddish brown to light yellowish brown; pronotal lateral borders more or less rounded; pygidium with more punctures; total body length: 7.2–13.5 mm, humeral width: 4.6–6.0 mm. Female paratypes are similar to the allotype except by total body length: 7.0–14.6 mm; humeral width: 5.2–6.0 mm.

Biological Data.—Specimens of *P. cahitana* were collected at lights in open deciduous tropical forest, thorn forest and xeric shrubs located from 10 to 50 m of altitude, with 25–26° C mean annual temperature and 307–320 mm total annual rainfall, where *Prosopis juliflora* (Swartz) DC, *Acacia cymbispina* Spegue et Riley, *Cercidium torreyanum* (Wats.) Sarg. and *Pithecollobium sonorae* Wats

(Caesalpinaceae) are the most common trees. Phenology: July (8), August (3). The other species of *Phyllophaga* flying at the same time and places were *P. (s.str.) fucata* (Horn), and one undescribed species of *P. (Listrochelus)*.

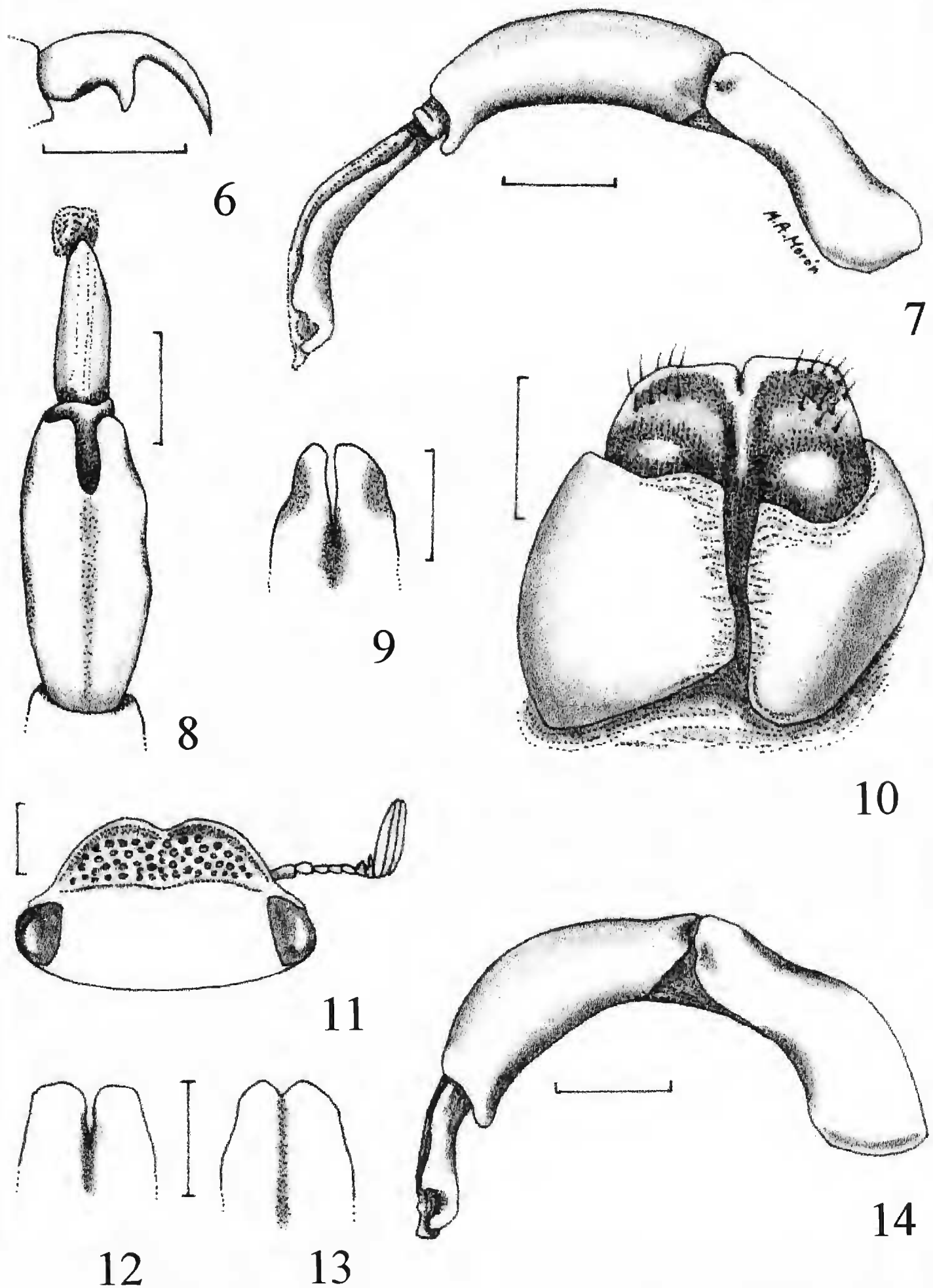
Remarks.—*Phyllophaga cahitana* resembles some species in the species group *fucata* (*sensu* Morón 1986), by the external characters, as well as the shape of clypeus, pronotum and elytra, style of punctuation, reduced vestiture, shape of male tarsal claws and female dorsal genital plates, however, the compressed shape of parameres is quite different from the short tube-like parameres of *P. fucata* or *P. opaca* (Moser). Also, the tooth of the tarsal claws in female *P. cahitana* are smaller than in *P. fucata*, and the female tarsi of the latter are longer than in *P. cahitana*.

Etymology.—Derived from the indigenous people named “Cahita” that actually live in some localities of Sonora and Sinaloa, speaking the language “cahita” (Tarahumara-Cahita subgroup of Sonoran languages), also known as “Yaqui” or “Mayo” (Manrique 1988).

PHYLLOPHAGA (PHYLLOPHAGA) QUETZALA MORÓN, NEW SPECIES
(Figs. 6–14)

Types.—(Described from 26 males and 49 females). Holotype, male; MEXICO. NUEVO LEÓN, Monterrey, Mesa Chipinque, 26–29 August 1960, H. F. Howden; deposited Canadian National Collection, Ottawa. Allotype female; same data as holotype; deposited A. & H. Howden/Canadian Museum of Nature, Ottawa. Paratypes: same data as holotype, except “on walnut” (7 males, 19 females) (CNC; MXAL); Mesa Chipinque, nr. Monterrey, 8 July 1963, light, A. T. Howden (1 male) (HAHC); same data except 30 July 1963 (1 male, 1 female) (HAHC); near Monterrey, Mesa Chipinque, 5400', 30 July 1963, H. Howden (6 females) (CNC); 6 mi S Monterrey, 17 July 1963, H. & A. Howden (1 male) (CNC); Chipinque, 22 June 1971, H.F. Howden (1 male, 1 female) (HAHC); 10 km S Chipinque, 4500', 2 June 1983, UV, K. Kaulbars & R. Anderson (9 males, 20 females) (HAHC; MXAL); TAMAULIPAS, Gómez Farías, 29 June 1969, deciduous forest, S. & J. Peck, (1 female) (HAHC); Ciudad Victoria, Rancho La Reja, 30 July / 1 August 1981, 6000–8000' B. C. Ratcliffe & C. L. Messenger (6 males, 1 female) (UNSM; MXAL).

Holotype.—Male. Head and pronotum, shiny dark brown, elytra, pygidium, sterna and legs shiny reddish brown, slightly pruinose, with iridescent luster. Clypeus bilobed, wider than long (4:1), anterior border deeply sinuated with margins slightly elevated (Fig. 11), disk surface convex, with dense, round punctures, and erect, short setae. Fronto-clypeal suture slightly curved, clearly impressed. Frons wider than long (3:1) convex, rugo-punctate, with medium size, whitish, slender setae. Antenna 10 segmented, with 3 segmented club; lamellae as long as the length of the six preceding segments combined, segments 4° or 5° as long as segment 3°, segments 6° and 7° wider than long, each one with large, acute process directed forward. Frons 6× wider than each eye dorsal diameter. Canthus curved and rounded, with 9 setae. Labrum bilobed, deeply notched, with curved slender, long setae on borders. Mentum wide and shallowly concave, polished, with lateral slender setae, anterior border briefly sinuate. Pronotum wider than long (1.7:1) and 2.2× wider than frons. Pronotal disk with dense, round punctures uniformly distributed, separated by a distance of 1–2 diameters, with erect, whitish medium size setae; lateral borders strongly angulated, marginal bead crenulate, with long, slender setae; anterior angles right, prominent; posterior angles slightly obtuse, prominent. Scutellum 1.9× wider than long, with 48 round, shallow setiferous punctures. Elytron 2.5× longer than wide, densely punctate, with dense, erect, whitish, medium size setae, uniformly distributed; epipleural border extended along the complete margin, narrowed toward the apex and provided with a fringe of short setae; humeral calla



Figures 6–14. *Phyllophaga (s.str.) quetzala* Morón.

Figure 6. Male protarsal claw.

Figure 7. Holotype genital capsule, lateral view.

Figure 8. Paramera and aedeagus of holotype, dorsal view.

Figure 9. Apex of paramera of holotype, dorsal view.

Figure 10. Allotype genital plates, ventral view.

Figure 11. Paratype head, dorsal view.

Figure 12. Apex of paramera of paratype, dorsal view.

rounded, prominent; apical calla rounded. Metathoracic wings completely developed. Propygidium shiny, densely punctate, covered with many whitish, short setae. Pygidium shiny, slightly convex, densely punctate and covered with many whitish, short setae; apical margin with 14 slender setae; basal margin effaced at the middle. Pterosternum with long, dense, whitish setae. Visible abdominal sternites 2° to 4° convex at the midline, densely covered with whitish, short setae on all surface; sternite 5° convex, prominent, with vague patch of granules at the middle, densely covered with whitish, short setae; anal plate shallowly concave, granulose-punctate, with some erect, slender setae, anterior border with vague bead and posterior border moderately thickened. Protibiae nearly as long as protarsi (0.9:1), with two big, rounded teeth toward the apex and one small tooth near the middle on external border, preapical spur long, straight, acute, slightly longer than 2° protarsomerus (0.8:1). Mesotibiae with one oblique, strong, setiferous, transverse carina, and setiferous point on external side; upper apical spur nearly straight, narrowed, 1.3× longer than the lower spur. Metatibiae shorter than metatarsi (0.8:1), with one oblique, strong setiferous transverse carina and setiferous point on the external side; apical spurs articulated with the border, upper spur, straight, narrow, with acute apex, shorter than 2° metatarsomerus, and 1.5 longer than the lower spur. Tarsomeres semicylindrical, elongated, with enlarged apex, some setae around the apex and scattered setae ventrally; metatarsomeres 1°–4° ventrally with one row of short, stout setae. Tarsal claws symmetrical, similar on all legs, with large, curved tooth near the middle of ventral border (Fig. 6). Genital capsule with long, curved, tube-like paramera, fused at their basis, apex dorsally deep cleft, ventrally narrowly cleft. Tectum convex. Basal piece slightly shorter than paramera (1:1.1). Aedeagus long, with sclerotized, sinuose, narrow support (Figs. 7–9). Length of genital capsule from the apex of parameres to the border of basal piece: 4.5 mm. Total body length: 15.5 mm. Humeral width: 6.6 mm.

Allotype.—Female. Similar to holotype except as follows: antennal club as long as the 5 preceding segments; disk of pygidium less convex, with apical fifth slightly upturned; 5° sternite convex, without granules at the middle; apical spurs of metatibiae widened, lanceolate; anal plate convex, with scattered erect whitish setae. Ventral genital plates strongly sclerotized, slightly asymmetrical, convex, with microscopic punctures toward borders, without setae; dorsal genital plates fused, with wide, truncated distal borders provided with 10–12 setae on each side, and rounded prominences near the middle proximal surface (Fig. 10). Total body length: 16.0 mm. Humeral width: 6.9 mm.

Type Locality.—Mesa de Chipinque, west of Monterrey city, state of Nuevo León, México (approx. 25°36' N; 100°38'35" W).

Variation.—Male paratypes from 10 km S Chipinque are similar to the holotype except in the length and width of tube-like paramera, degree of dorsal and ventral curves of paramera, and deep and width of apical notch of paramera (Figs. 12–14). Male paratypes from Rancho La Reja, Ciudad Victoria, Tamaulipas have long, erect, slender setae mixed with short setae on the elytra, but the shape of paramera is similar to the specimens from 10 km S Chipinque. Total body length: 15.2–18.2 mm, humeral width: 6.1–8.0 mm. Female paratypes from Nuevo León localities are similar to the allotype except by total body length: 15.2–16.3 mm; humeral width: 6.4–7.0 mm. Female paratype from Rancho La Reja, have long, erect setae mixed with short setae on the elytra, the ventral genital plates with distal border widely notched, and the prominences near the middle proximal surface of dorsal genital plates are less rounded.

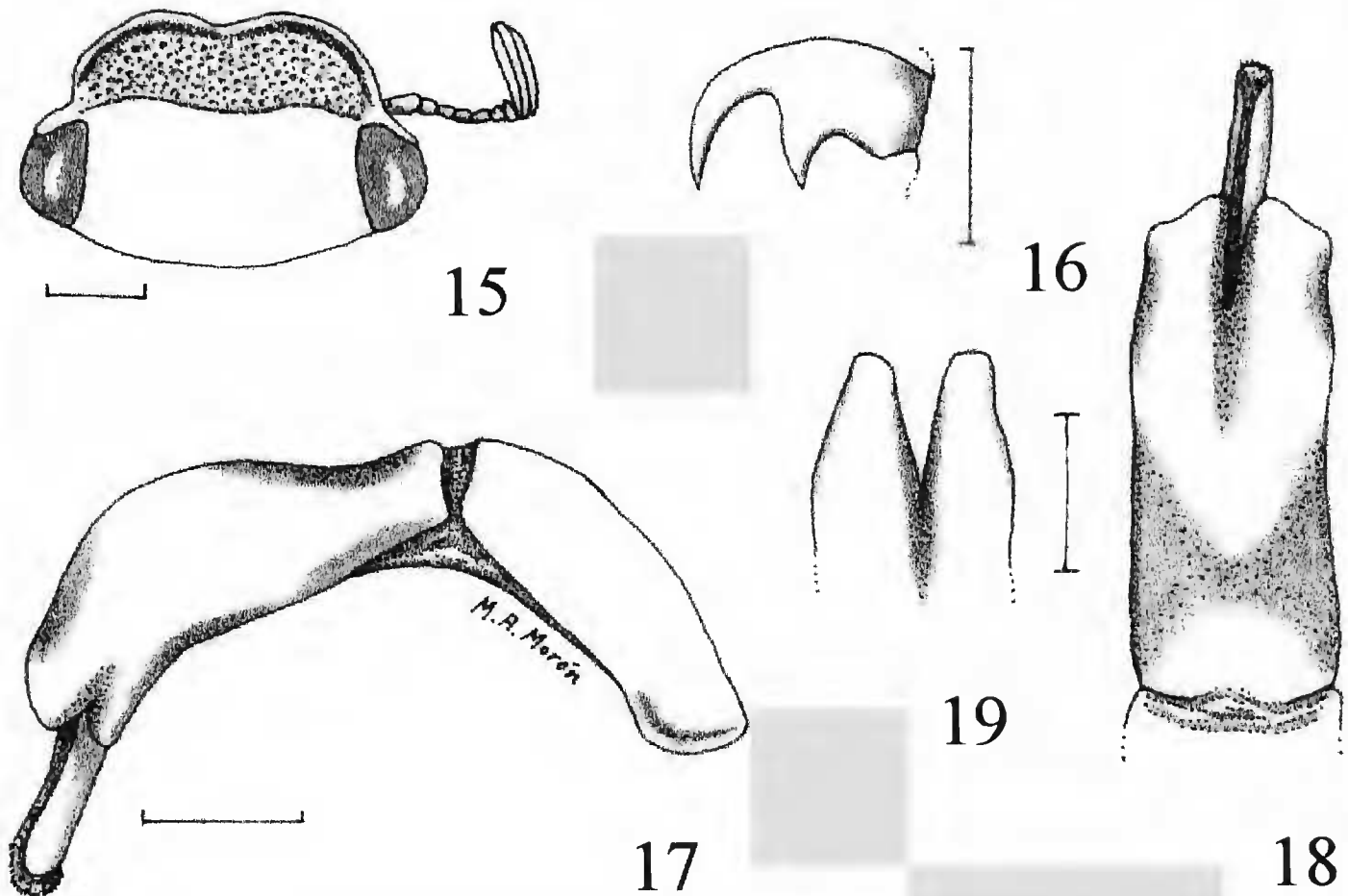
Biological Data.—Specimens of *P. quetzala* was collected at lights or on walnut trees (*Juglans mollis* Engelm.) in temperate mixed forests with *Quercus monterreyensis*, *Q. polymorpha* Schl. et Cham., *Q. clivicola* (Fagaceae), *Carya myristiciformis* (Michx.) (Juglandaceae), and *Pinus teocote* Schl. et Cham. (Pinaceae), located at 1400–2600 m of altitude. Phenology: June (32), July (17), August (26). The other species of *Phyllophaga* flying at the same time and place was *P. (s.str.) rolbakeri* Saylor.

Remarks.—*Phyllophaga quetzala* is similar to *P. opacita* Reinhardt from south-

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Figure 13. Apex of paramera of paratype, ventral view.

Figure 14. Paratype genital capsule, lateral view. Scale lines: Figs. 6, 10 = 0.5 mm; Figs. 7–9, 11–14 = 1 mm.



Figures 15–19. *Phyllophaga (s.str.) quetzaloides* Morón.

Figure 15. Holotype head, dorsal view.

Figure 16. Male protarsal claw.

Figure 17. Holotype genital capsule, lateral view.

Figure 18. Paramera and aedeagus, dorsal view.

Figure 19. Apex of paramera, ventral view. Scale lines: Figs. 16 = 0.5 mm; Figs. 15, 17–19 = 1 mm.

ern Texas in general body shape, form of clypeus, kind of body vestiture, form of tarsal claws, and basic structure of paramera, but the tube-like paramera of the new species are much longer with the ventro-apical border much shorter, and the apex of the aedeagus does not have sclerotized spines; male of *P. opacita* have the middle of 5^o sternite clearly granulose, and the dorsal punctuation much finer. Also, *P. quetzala* is closely related to *P. quetzaloides* n.sp., as described below.

Etymology.—Derived from old Nahuatl language “*quetzalli*”, meaning “something beautiful, pretty, or special” (Simeón 1975), because this species have a nice presence with the combination of abundant whitish setae and iridescent luster of tegument.

PHYLLOPHAGA (PHYLLOPHAGA) QUETZALOIDES MORÓN, NEW SPECIES
(Figs. 15–19)

Types.—(Described from 2 males). Holotype, male; MEXICO. SAN LUIS POTOSÍ, 6.8 mi W Chupaderos, 11 July 1973, 3400', R.R. Snelling & T.W. Taylor; deposited: Los Angeles County Museum, California. Paratype: Same data as holotype (1 male) (MXAL).

Holotype—Male. Head and pronotum, shiny dark brown, elytra, pygidium, sterna and legs shiny reddish brown, slightly pruinose, with vague iridescence. Clypeus bilobed, wider than long (3.7:1), anterior border deeply sinuated with margins moderately elevated (Fig. 15), disk surface concave, densely rugo-punctate, with erect, short setae. Fronto-clypeal suture slightly curved, clearly impressed.

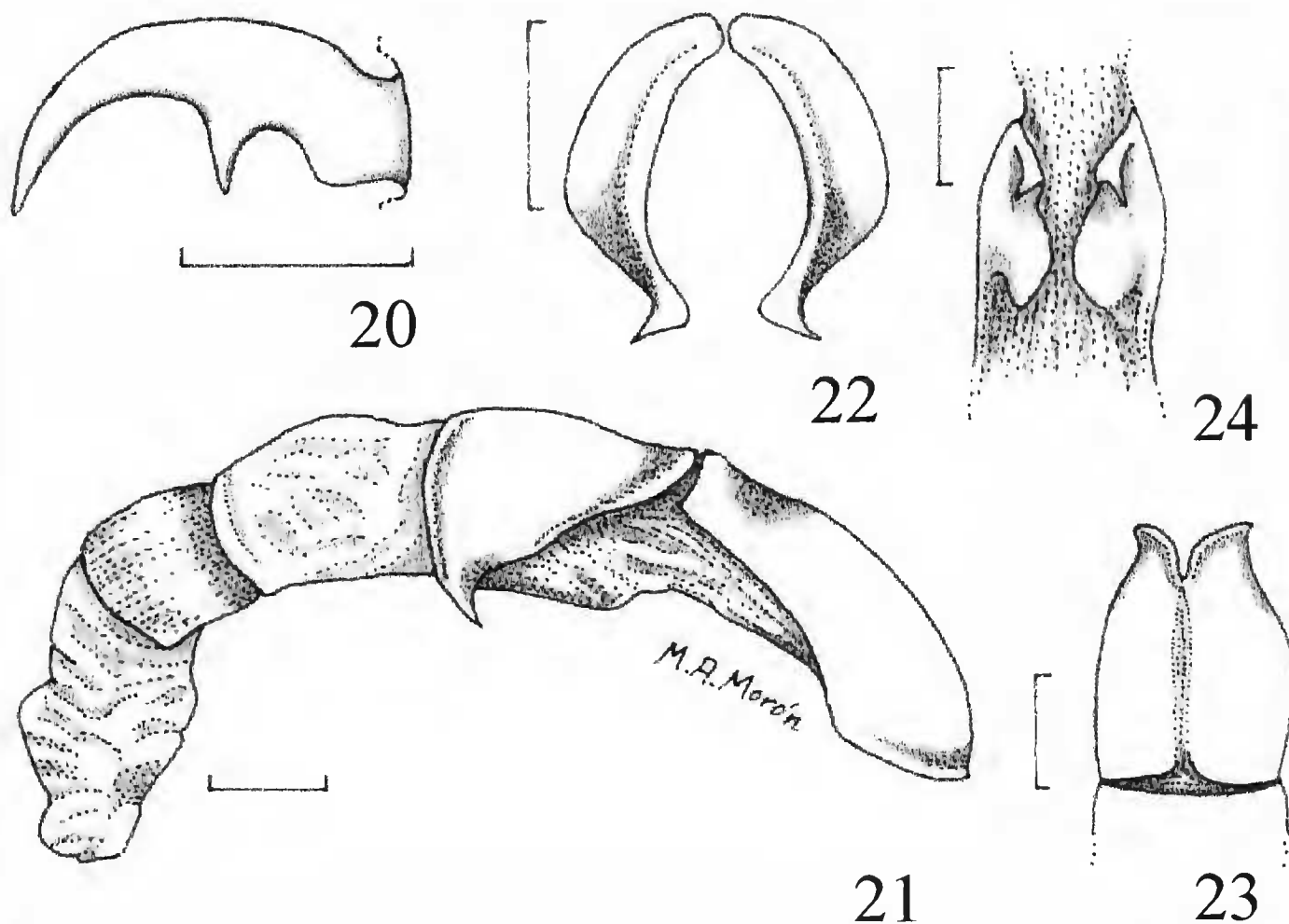
Frons wider than long (3:1) convex, rugo-punctate, with medium size, whitish, erect, slender setae. Antenna 10 segmented, with 3 segmented club; lamellae as long as the length of the six preceding segments combined, segments 4° or 5° as long as segment 3°, segments 6° and 7° wider than long, each one with acute process directed forward. Frons 4.2× wider than each eye dorsal diameter. Canthus curved and rounded, with 10 setae. Labrum bilobed, deeply notched, with curved slender, long setae on borders. Mentum wide and shallowly concave, polished, with lateral slender setae, anterior border notched. Pronotum wider than long (1.6:1) and 2.4× wider than frons. Pronotal disk with dense, round punctures uniformly distributed, separated by a distance of 1 diameter, or less, with erect, whitish medium size setae; lateral borders strongly angulated, marginal bead deeply crenulate, with long, slender setae; anterior angles right, prominent; posterior angles slightly obtuse, slightly prominent. Scutellum 1.7× wider than long, with 65 round, shallow, setiferous punctures. Elytron 2.4× longer than wide, densely punctate, with dense, erect, whitish, medium size setae, uniformly distributed; epipleural border extended along the complete margin, narrowed toward the apex and provided with dense fringe of short setae; humeral calla rounded, prominent; apical calla rounded. Metathoracic wings completely developed. Propygidium shiny, densely punctate with many whitish, short setae on all surface. Pygidium shiny, moderately convex, densely punctate with many whitish, short setae on all surface; apical margin with 18 slender setae; basal margin effaced at the middle. Pterosternum with long, dense, whitish setae. Visible abdominal sternites 2° to 4° convex at the midline, densely covered with whitish, short setae on all surface; sternite 5° convex, prominent, with vague patch of granules at the middle, densely covered with whitish, short setae; anal plate shallowly concave, granulose-punctate, with some erect, slender setae, anterior border with vague bead and posterior border moderately thickened. Protibiae slightly shorter than protarsi (0.7:1), with two big, rounded teeth toward the apex and one small tooth near the middle on external border, preapical spur long, straight, acute, as long as 2° protarsomerus. Mesotibiae with one oblique, strong, wide, setiferous, transverse carina, at middle of external side, and other short transverse, setiferous carina toward basal articulation; upper apical spur nearly straight, narrowed, 1.2× longer than the lower spur. Metatibiae shorter than metatarsi (0.7:1), with one oblique, strong, wide, setiferous transverse carina near the middle of external side and other, short, setiferous carina toward the basal articulation; apical spurs articulated with the border, upper spur, straight, narrow, with acute apex, shorter than 2° metatarsomerus, and 1.3× longer than lower spur. Tarsomeres semicylindrical, elongated, with enlarged apex, some setae around the apex and scattered setae ventrally; metatarsomeres 1°–4° ventrally with one row of short, stout setae. Tarsal claws symmetrical, similar on all legs, with wide, curved tooth near the middle of ventral border (Fig. 16). Genital capsule with long, curved, tube-like paramera, fused at their basis, apex dorsally deep cleft, ventrally notched. Tectum convex. Basal piece shorter than paramera (1:1.4). Aedeagus long, with sclerotized, straight, narrow support (Figs. 17–19). Length of genital capsule from the apex of parameres to the border of basal piece: 4.3 mm. Total body length: 17.1 mm. Humeral width: 6.9 mm. *Female*. Unknown.

Type Locality.—Sierra de Charcas, Charcas, state of San Luis Potosí, México (approx. 23°9' N; 101°15' W).

Variation.—Male paratype is similar to the holotype except in body color reddish brown and total body length: 17.4 mm, humeral width: 7.0 mm.

Biological Data.—Specimens of *P. quetzaloides* were collected at lights in oak forest with *Quercus crassifolia* H. & B. and *Q. microphylla* Née (Fagaceae), located at 1100 m of altitude. Phenology: July (2). Sierra de Charcas, San Luis Potosí is approximately 280 km from Mesa de Chipinque, Nuevo León, and 200 km from Sierra Peña Nevada, Tamaulipas, where *P. quetzala* Morón occurs; these montane subsystems probably were connected in the recent past by way of Sierra de Catorce, S.L.P. and Sierra de Potosí, Nuevo León. The other species of *Phyllophaga* flying at the same time and place was *P. (s.str.) rugipennis* (Schauffus).

Remarks.—*Phyllophaga quetzaloides* is similar to *P. quetzala* Morón in its body shape, kind of body vestiture, and tube-like structure of the paramera, but dorsally the apices of the paramera in *P. quetzaloides* are longer and wider than in *P. quetzala*, and ventrally the apices in *P. quetzaloides* are longer and more separated than in *P. quetzala*. Externally, the former species are much densely



Figures 20–24. *Phyllophaga* (*s.str.*) *regiomontana* Morón.

Figure 20. Male protarsal claw.

Figure 21. Holotype genital capsule, lateral view.

Figure 22. Paramera, distal view.

Figure 23. Paramera, dorsal view.

Figure 24. Paramera, ventral view. Scale lines: Fig. 20 = 0.5 mm; Figs. 21–24 = 1 mm.

punctate, with anterior border of clypeus widely bilobed, 7^o antennal segment without acute anterior projection, pygidium more convex, and tarsal claws slightly shorter and wider than in *P. quetzala*. It is very possible that *P. opacita*, *P. arcta* (Horn), *P. quetzala* and *P. quetzaloides* are part of a group of species distributed from Alabama and Texas to the northwestern mountains of Mexico, but is necessary to obtain more samples from montane localities in Coahuila, Nuevo León, Tamaulipas and San Luis Potosí, before describing the new group. According with Luginbill & Painter (1953) *P. opacita* and *P. arcta* also are not common species.

Etymology.—Derived from old Nahuatl language “*quetzalli*”, and Greek suffix “*oeidos*”, Neolatin “*oides*”, denoting likeness of form (Jaeger 1978) because this species is very similar to *P. quetzala* Morón.

PHYLLOPHAGA (PHYLLOPHAGA) REGIOMONTANA MORÓN, NEW SPECIES

(Figs. 20–24)

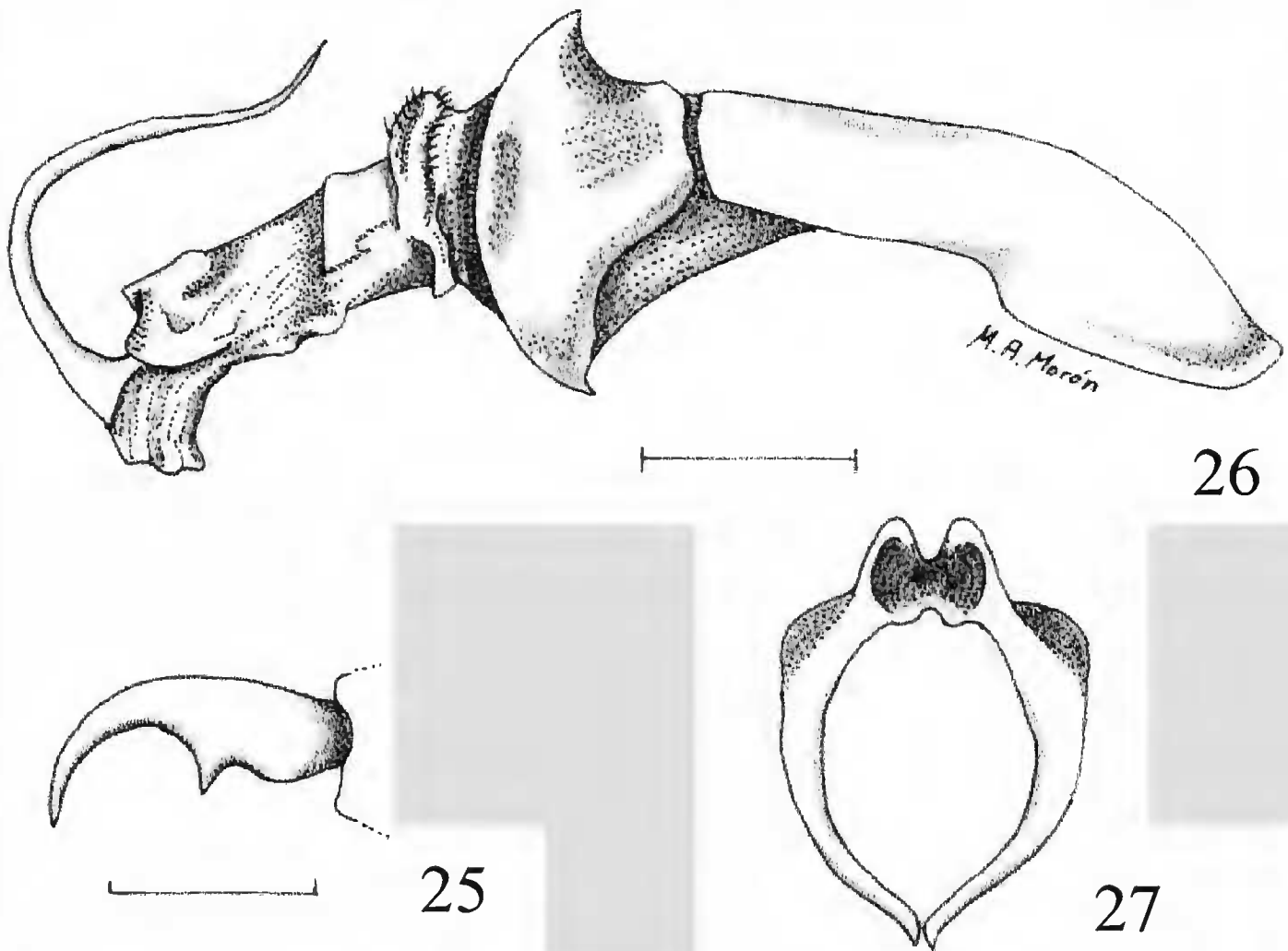
Types.—(Described from 3 males). Holotype, male; MEXICO: NUEVO LEÓN, Monterrey, Mesa Chipinque, 26 June 1974, B.C. Ratcliffe; deposited: University of Nebraska State Museum, Lincoln. Paratypes: Same data as holotype (2 males) (UNSM; MXAL).

Holotype.—Male. Head shiny dark brown, pronotum, elytra, pygidium, sterna and legs shiny reddish brown; each elytron with interstriae slightly pruinose, whitish dull. Clypeus bilobed, wider than long (3.3:1), anterior border deeply sinuated with margins moderately elevated, disk surface convex, coarsely rugo-punctate, with erect, long setae. Fronto-clypeal suture vaguely sinuate, partially covered by rugose punctures. Frons wider than long (2.5:1) convex, irregularly rugo-punctate, with yellowish, long, erect setae. Antenna 10 segmented, with 3 segmented club; lamellae slightly longer than the length of the five preceding segments combined (1.2:1), segments 4° or 5° nearly as long as segment 3°, segments 6° and 7° wider than long, each one with acute process directed forward. Frons 5.5× wider than each eye dorsal diameter. Canthus narrow, curved and rounded, with 11 setae. Labrum bilobed, deeply notched, with curved slender, long setae on borders. Mentum wide and shallowly concave, polished, with transverse narrow sulcus near the middle and lateral slender setae, anterior border widely notched. Pronotum wider than long (1.8:1) and 2.0× wider than frons. Pronotal disk with deep, round punctures, densely grouped toward anterior border and irregularly scattered toward the sides and posterior border; with many erect, yellowish, very long setae near the anterior margin; basal bead with deep punctures and long, erect setae; lateral borders strongly angulated, lateral bead deeply crenulate, with long, erect setae; anterior angles nearly right, clearly prominent; posterior angles slightly obtuse, poorly prominent. Scutellum 1.7× wider than long, with 22 round, shallow, scattered punctures with minute setae. Elytron 3× longer than wide, with dense, irregular, deep, round punctures, and scattered, short setae on the disk; some erect, long setae near midline and near lateral borders; epipleural border extended along the complete margin, narrowed toward the apex and provided with fringe of long setae; humeral calla rounded, prominent; apical calla rounded. Metathoracic wings completely developed. Propygidium dull, densely punctate with many short setae mainly toward posterior border. Pygidium slightly dull, moderately convex, with high number of shallow, round punctures and mixture of short and medium size setae on disk; apical margin with 2 slender setae; basal margin effaced at middle. Pterosternum with long, dense, yellowish setae. Visible abdominal sternites 2° to 4° convex at the midline, finely punctate with scattered, short setae; sternite 5° convex, prominent, slightly rugo-punctate at middle, with scattered short setae toward posterior border; anal plate very short, transversely sulcated, punctate, with some setae on sides and middle of posterior border; anterior border clearly elevated toward sides. Protibiae slightly shorter than protarsi (0.9:1), with two big, rounded teeth toward the apex and one small tooth near the middle on external border, preapical spur long, straight, acute, as long as 2° protarsomerus. Mesotibiae with one oblique, strong, wide, setiferous, transverse carina, at middle of external side, and other short transverse, setiferous carina toward basal articulation; upper apical spur nearly straight, narrowed, 1.2× longer than the lower spur. Metatibiae shorter than metatarsi (0.7:1), with one oblique, strong, wide, setiferous transverse carina near the middle of external side and one acute, short, setiferous tubercle toward basal articulation; apical spurs articulated with border, upper spur, straight, narrow, with rounded apex, shorter than 2° metatarsomerus, and 1.2× longer than lower spur. Tarsomeres semicylindrical, elongated, with enlarged apex, some setae around the apex and scattered setae ventrally; metatarsomeres 1°–4° ventrally with 1 or 2 rows of short, stout setae. Tarsal claws symmetrical, similar on all legs, with short, acute tooth after the middle of ventral border (Fig. 20). Genital capsule with moderately long, wide paramera, not fused at their basis, apex ventrally with acute spine. Tectum slightly concave. Basal piece longer than paramera (1.5:1). Aedeagus long, wide, with slightly sclerotized, preapical ring, without macroscopic spines or other sclerotized plates (Figs. 21–24). Length of genital capsule from the apex of parameres to the border of basal piece: 5.8 mm. Total body length: 17.9 mm. Humeral width: 7.2 mm. *Female*. Unknown.

Type Locality.—Mesa de Chipinque, west of Monterrey city, state of Nuevo León, México (approx. 25°36' N; 100°38' 35" W).

Variation.—Male paratypes are similar to the holotype except in number of erect long setae around the pronotum, and along the elytra; extension of whitish pruinosity on sternites and sides of elytra; total body length: 17.2–17.4 mm, humeral width: 7.0–7.1 mm.

Biological Data.—Specimens of *P. regiomontana* were collected at lights in mixed temperate forest located at an altitude of 1000 m, formed by *Quercus clivicola*, *Q. canbyi* Trel. (Fagaceae), *Juglans mollis* Engelm., *Carya myristiciformis* (Michx.) (Juglandaceae) and *Pinus pseudostrobus* Lindl. (Pinaceae). Phenology: June (3). No other species of *Phyllophaga* were recorded flying at the same time and place.



Figures 25–27. *Phyllophaga (s.str.) stzotzilana* Morón.

Figure 25. Male protarsal claw.

Figure 26. Paratype genital capsule, lateral view.

Figure 27. Paramera, distal view. Scale lines: Fig. 25 = 0.5 mm; Figs. 26–27 = 1 mm.

Remarks.—*Phyllophaga regiomontana* is not related to any known Mexican species. Basic structure of the paramera is similar to *P. dispar* (Burmeister) from the southeastern United States, but the spine-like apex of paramera of latter are longer and turned to the midline ventrally, the antenna is composed of 9 segments, the anterior border of clypeus is entire and the abdominal sternites are flattened mesially.

Etymology.—Derived from Spanish name “*regiomontano (a)*” given to the people and things from the Monterrey city and surrounding areas; meaning “from the mountain of the king”.

PHYLLOPHAGA (PHYLLOPHAGA) STZOTZILANA MORÓN, NEW SPECIES
(Figs. 25–27)

Types.—Described from 2 males. Holotype, male; MEXICO: CHIAPAS, Cañón del Sumidero, (17 km N Tuxtla Gutiérrez), Mirador La Coyota, 20 May 1979, 1340 m, R. Terrón; deposited: M.A. Morón collection, Xalapa. Paratype: Chiapas, Ocozocuaula, El Ocote, Ejido Nueva Providencia, 16 May 1996, O. Gómez (1 male) (ECOSUR).

Holotype.—Male. Head and pronotum shiny dark reddish brown, elytra, pygidium, and sterna reddish brown with whitish dull, pruinose vestiture, legs shiny reddish brown. Clypeus rounded, wider than long (3.6:1), anterior border nearly straight with margins noticeably elevated, disk surface deep concave, coarsely rugo-punctate, with erect, slender setae. Fronto-clypeal suture deeply sinuate, par-

tially covered by rugose punctures. Frons wider than long (1.7:1) convex, coarsely rugo-punctate, with yellowish, long, erect setae. Antenna 10 segmented, with 3 segmented club; lamellae 1.6× longer than the length of the five preceding segments combined, segments 4° or 5° nearly as long as segment 3°, segments 6° and 7° wider than long, each one with acute process directed forward. Frons 3.6× wider than each eye dorsal diameter. Canthus wide, curved and rounded, with 12 setae. Labrum bilobed, widely sinuated, with curved slender, long setae on borders. Mentum wide and shallowly concave, polished, with lateral slender setae, anterior border nearly straight. Pronotum wider than long (1.6:1) 2.5× wider than frons. Pronotal disk with deep, round punctures and many erect, yellowish, long, slender setae uniformly distributed on all disk, punctures separated by 1–1.5 diameters; lateral borders strongly angulated, lateral bead deep and irregularly crenulate, crenulations progressively narrower from anterior angle to posterior angle, with long, erect setae; anterior angles nearly right, clearly projected; posterior angles slightly obtuse, slightly prominent toward ventral area. Scutellum 1.3× wider than long, with 42 shallow, irregular punctures with short setae. Elytron 2.7× longer than wide, with dense, regularly distributed, shallow, round punctures, and abundant, short setae on all surface; epipleural border extended along the complete margin, narrowed toward the apex and provided with dense fringe of short setae; humeral calla rounded, prominent; apical calla rounded. Metathoracic wings completely developed. Propygidium slightly shiny, densely punctate with many short setae. Pygidium slightly dull, uniformly convex, with dense round punctures and short setae on disk, with some medium size, erect setae toward apex; apical margin with 16 slender setae; basal margin effaced at middle. Pterosternum with long, dense, yellowish setae. Visible abdominal sternites 2° to 4° slightly depressed at midline, slightly pruinose with scattered, short setae; sternite 5° convex, slightly rugo-punctate at middle, with scattered short setae; anal plate transversely concave, punctate, with scattered setae on all surface; posterior and anterior borders clearly elevated. Protibiae slightly shorter than protarsi (0.9:1), with two big, rounded teeth toward the apex and one small, rounded tooth near the middle of external border, preapical spur long, straight, acute, shorter than 2° protarsomerus. Mesotibiae with one oblique, strong, wide, setiferous, transverse carina, at middle of external side, and 3–4 short spines on dorsal border; upper apical spur nearly straight, narrowed, as long as lower spur. Metatibiae shorter than metatarsi (0.8:1), with one oblique, strong, wide, setiferous transverse carina near the middle of external side, and 3–4 short spines on dorsal border; apical spurs articulated with border, upper spur, slightly curved, narrow, with rounded apex, much shorter than 2° metatarsomerus, and 1.3× longer than lanceolate, lower spur. Tarsomeres semicylindrical, elongated, with enlarged apex, some setae around the apex and scattered setae ventrally; metatarsomeres 1°–4° ventrally with 2 rows of short, stout setae. Tarsal claws symmetrical, similar on all legs, with short, acute tooth after the middle of ventral border (Fig. 25). Genital capsule with short, wide paramera, fused at their dorsal basis, with excavated acute projections, apex progressively narrowed. Tectum convex. Basal piece much longer than paramera (2.5:1). Aedeagus long, wide, dorsally with strongly sclerotized, preapical very long and sinuose bar, with some short setae on the basis (Figs. 26–27). Length of genital capsule from apex of parameres to border of basal piece: 4.1 mm. Total body length: 17.1 mm. Humeral width: 7.0 mm. *Female*. Unknown.

Type Locality.—Mesa de Ocozocuatla, Ocozocuatla municipality, state of Chiapas, México (approx. 16°52' N; 93°22' W).

Variation.—Male paratype is similar to holotype except as follows: punctures on the pronotal disk slightly wider; crenulation on the lateral border of pronotum more irregular; apex of dorso-basal process of paramera slightly rounded; preapical sinuose bar of aedeagus without setae on basis; elytra dark reddish brown; total body length: 15.8 mm, humeral width: 6.6 mm.

Biological Data.—Specimens of *P. stzotzilana* were collected at lights in tropical deciduous forest, located at an altitude of 1000–1340 m, formed by *Helio- carpus reticulatus* Rose (Tiliaceae), *Bursera simaruba* Sarg. (Burseraceae), *Swietenia humilis* Zucc. (Meliaceae), *Alvaradoa amorphoides* Liebm. (Simarubaceae), *Lonchocarpus longipedicellatus* Pitt. (Caesalpinaceae) and many other tropical trees. Phenology: May (2). Other species of *Phyllophaga* flying at same time and place were *P. (s.str.) spaethi* (Nonfried), *P. (s.str.) testaceipennis* (Blanchard), *P. (s.str.) tenuipilis* (Bates), *P. (Chlaenobia) latipes* (Bates), *P. (Phytalus) cometes* (Bates) and *P. (Ph.) obsoleta* (Blanchard).

Remarks.—*Phyllophaga stzotzilana* is not related to any known Mexican or

Central American species. The dense vestiture of short setae, shape of tarsal claws and paramera, with the unique form of the sclerotized accessory "spine" on the aedeagus will aid in the recognition of this new species.

Etymology.—Derived from Maya Tzeltal language, *stzotzil*, meaning "hairy" (M. Girón, personal communication)

PHYLLOPHAGA (PHYLLOPHAGA) PILULA (Moser, 1921)

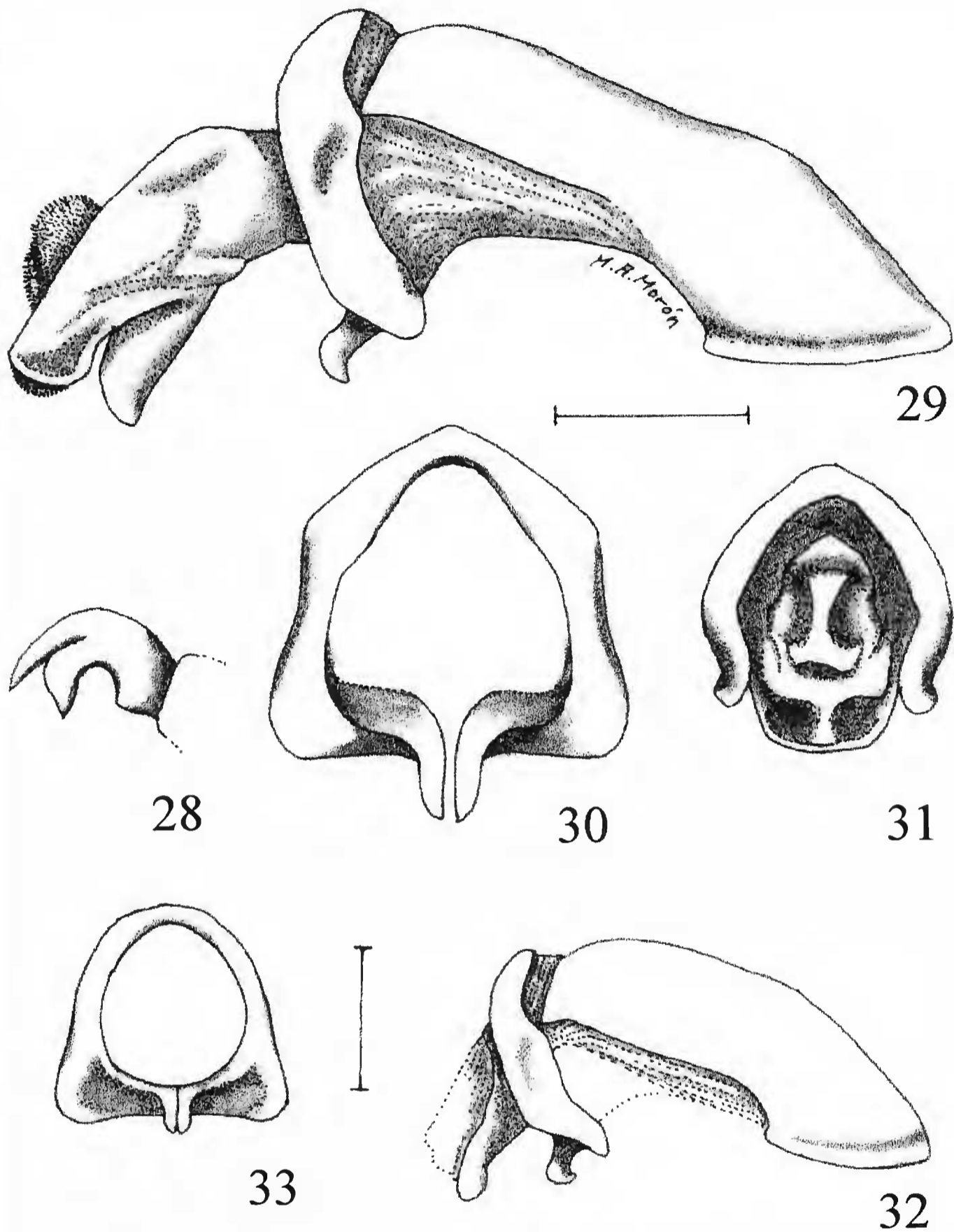
Deutsche Ent. Zeit. 3: 250

(Figs. 28–33)

Studied Specimens.—(2 males). Type, male; "Mexiko" (ZMHU). MEXICO: CHIAPAS, 8 mi NE San Cristóbal de las Casas, 9-V-1969, H. F. Howden (1 male) (HAHC).

Redescription.—Male. Head, pronotum, elytra and pygidium shiny reddish dark brown (mahogany), sterna and legs shiny reddish brown. Clypeus bilobed, wider than long (3.3:1), anterior border widely sinuated with margins scarcely elevated, surface slightly convex, dense and deeply rugo-punctate, with long, slender setae. Fronto-clypeal suture slightly sinuated, obscured by the dense punctuation. Frons wider than long (2:1) convex, coarsely rugo-punctate, with long, slender setae. Antenna 10 segmented, with 3 segmented club; lamellae as long as the length of the six preceding segments combined, segment 4° longer than segment 3, segments 6° and 7° wider than long, each one with large, acute process directed forward. Frons 4.3× wider than each eye dorsal diameter. Canthus curved and rounded, with 9 setae. Labrum bilobed, with curved slender setae on the borders. Mentum nearly flat, polished, with lateral slender setae, anterior border notched. Pronotum wider than long (1.8:1) and 2.5× wider than frons. Pronotal disk with round, deep punctures uniformly distributed, separated by a distance of 1–2 diameters, with long, slender setae; lateral borders strongly angulated, marginal bead crenulate, with long slender setae; anterior angles obtuse, rounded, not prominent; posterior angles slightly obtuse, prominent. Scutellum 1.7× wider than long, with 26 rounded, shallow punctures. Elytron 2.5× longer than wide, densely rugo-punctate, with scattered erect, long setae, progressively shorter toward the apex; epipleural border extended along the complete margin, narrowed toward the apex and provided with a fringe of long setae; humeral calla rounded, prominent; apical calla rounded. Metathoracic wings completely developed. Propygidium shiny, finely punctate with short setae near the basis and some scattered setae toward the apex. Pygidium shiny, slightly convex, nearly flat at the center of disk, irregularly rugose with some shallow punctures and scattered setae of different length; apical margin with 18 slender setae; basal margin effaced at the middle. Pterosternum with long, dense, yellowish vestiture. Visible abdominal sternites 2° to 4° convex at the midline, with scattered setae; sternite 5° convex, prominent, with some punctures and sparse setae; anal plate widely concave, granulose, with some erect, slender setae, anterior border with narrowed bead and posterior border thickened. Protibiae nearly as long as protarsi (0.9:1), with two big teeth and one small tooth on external border, preapical spur long, straight, acute, slightly longer than 2° protarsomerus. Mesotibiae with one oblique, strong, setiferous, transverse carina; upper apical spur nearly straight, narrowed, 0.3× shorter than the lower spur. Metatibiae shorter than metatarsi (0.9:1), with one oblique, strong setiferous transverse carina on the external side and some granules along the dorsal border; apical spurs articulated with the border, upper spur wide with rounded apex, slightly curved, shorter than 2° metatarsomerus, and 1.4× longer than the lower spur. Tarsomeres semicylindrical, elongated, with enlarged apex, some setae around the apex and two lines of setae ventrally. Tarsal claws symmetrical, similar on all legs, with large tooth before middle of ventral border near the apex (Fig. 28). Genital capsule with long and sinuose paramera, fused at their dorsal basis, apex narrowed, right angled turned, slightly compressed, and curved downward. Tectum convex. Aedeagus long and wide, with sclerotized preapical tube and membranous apex densely covered with microscopic spines (Figs. 29–33). Length of genital capsule from the apex of parameres to the border of basal piece: 3.2–3.8 mm. Total body length: 14–16.8 mm. Humeral width: 6.8–7.1 mm. *Female*: Unknown

Biological Data.—Label on the type specimen gives no specific information about a precise locality or habitat from which the specimen was collected. One specimen of *P. pilula* was taken at lights in pine and oak forest formed mainly



Figures 28–33. *Phyllophaga* (*s.str.*) *pilula* (Moser).

Figure 28. Male protarsal claw.

Figure 29. Genital capsule, lateral view (specimen from San Cristóbal de Las Casas, Chiapas).

Figure 30. Paramera, distal view.

Figure 31. Apex of aedeagus, distal view.

Figure 32. Type genital capsule, lateral view.

Figure 33. Paramera, distal view. Scale lines = 1 mm.

by *Pinus oocarpa* Schiede, *P. montezumae* Lamb. (Pinaceae), *Quercus peduncularis* Née, *Q. brachystachys* Benth. and *Q. oleoides* Cham. et Schl. (Fagaceae). located at 2400 m of altitude, near volcano Tzontehuitz (approx. 16°44'12" N; 92°38'18" W). Phenology: May (1). Other species of *Phyllophaga* flying at the same time were *P. (Phytalus) senicula* (Bates), *P. (Ph.) lineatoides* Morón and *P. (s.str.) jovelana* Morón.

Remarks.—The type specimen shows some slight differences from the specimen from San Cristóbal de Las Casas, Chiapas, mainly in smaller body size, the antennal club is shorter, the elytra have fewer setae, and shape of paramera (Figs. 29–33). *Phyllophaga pilula* (Moser) is not closely related to any other Mexican species, but probably will be placed between the species groups *blanchardi* and *schizorhina* (*sensu* Morón 1986). Shape of the pronotum and last abdominal segments, form of the tarsal claws, general structure of the paramera, dorsal vestiture and punctuation suggest some relation with species in the complex “*pubicauda*”, but details and proportions of the genital capsule, and the pronotal and elytral sculpture are different. The basic design of the paramera also show some relationship to *P. nisuens* Saylor, but shape of the tarsal claws and the aedeagus are much different.

Etymology.—Derived from the Latin *pilula*, diminutive of *pila*, meaning “bullet” (Jaeger 1978), in reference to the ovate body shape of this species.

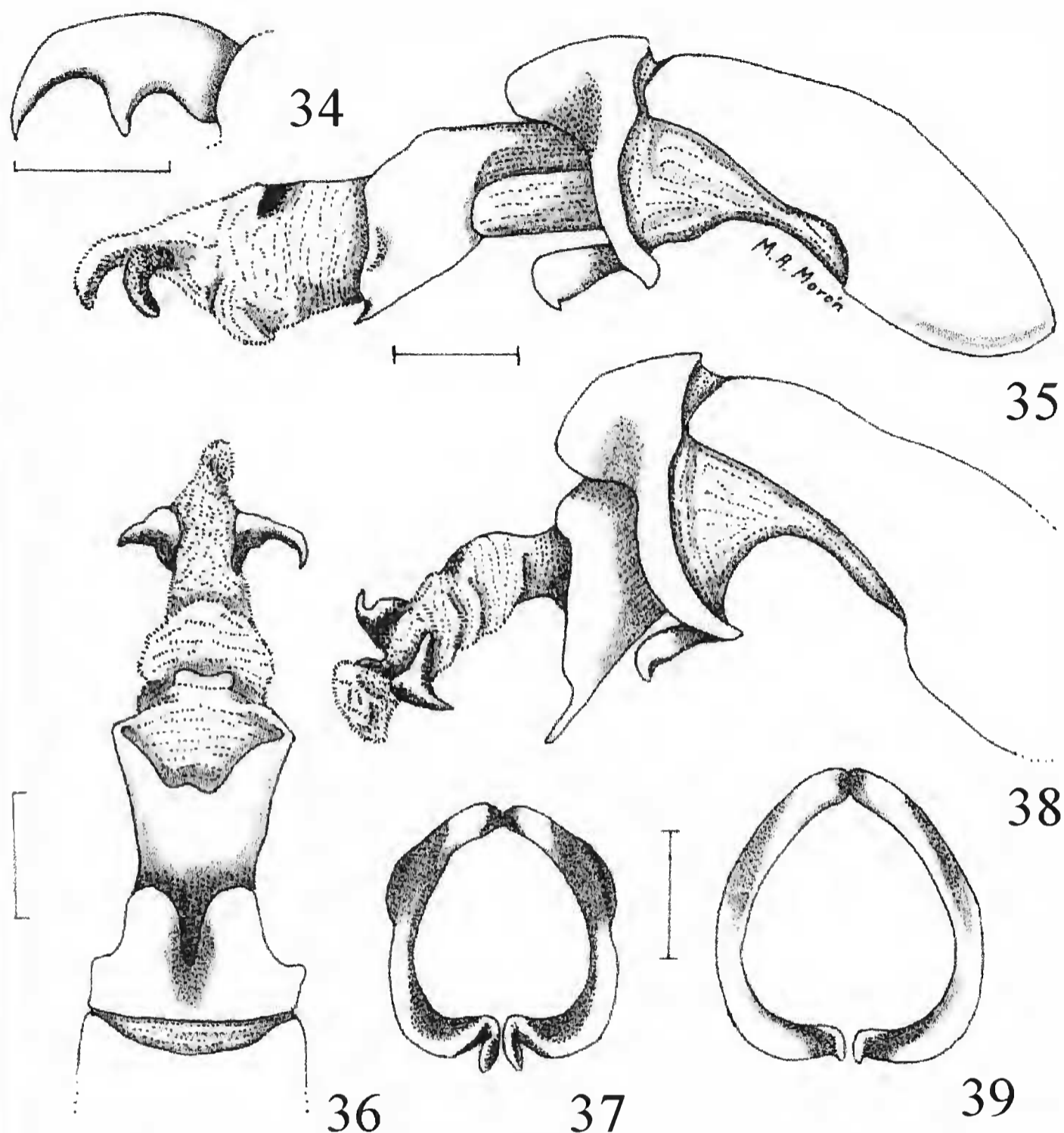
PHYLLOPHAGA (PHYLLOPHAGA) NISUENS Saylor, 1937

Proc. R. Ent. Soc. London (B) 6: 32–33

(Figs. 34–39)

Studied Specimens.—(6 males). Type, male; MEXICO: Parada (BMNH); MEXICO: OAXACA: 18 km N Guelatao, 28 August 1991, 2630 m, pino-encino, P. Rojas (2 males) (MXAL); Oaxaca, Concepción Papalo, 11 July 1997, 2500 m, G. Nogueira (3 males) (IEXA, MXAL).

Redescription.—Male. Head and pronotum, shiny dark reddish brown, elytra, pygidium, sterna and legs shiny reddish brown. Clypeus rounded, slightly bilobed, wider than long (3.7:1), anterior border briefly sinuated with margins scarcely elevated, surface convex, coarsely rugo-punctate, with scarce, short setae. Fronto-clypeal suture nearly straight, clearly impressed. Frons wider than long (2.1:1) convex, coarse and irregularly rugo-punctate, with some long, slender setae near the eyes. Antenna 10 segmented, with 3 segmented club; lamellae 1.5× longer than the length of five preceding segments combined, segment 4° longer than segment 3, segments 6° and 7° wider than long, each one with acute process directed forward. Frons 6× wider than each eye dorsal diameter. Canthus curved and rounded, with 9 setae. Labrum bilobed, deeply cleft, with curved slender setae on the borders. Mentum concave, polished, with transverse suture at middle and lateral slender setae, anterior border widely sinuate. Pronotum wider than long (1.8:1) and 2× wider than frons. Pronotal disk with round, deep punctures irregularly distributed, separated by a distance of 1-6 diameters, without setae; lateral borders strongly angulated, marginal bead shallowly crenulate, with long, slender setae; anterior angles obtuse, rounded, not prominent; posterior angles widely obtuse, not prominent. Scutellum 1.6× wider than long, without punctures. Elytron 2.6× longer than wide, densely rugo-punctate, without setae; epipleural border extended along complete margin, narrowed toward the apex and provided with some long setae on it basal fourth; humeral calla rounded, prominent; apical calla rounded. Metathoracic wings completely developed. Propygidium shiny, finely rugo-punctate with scattered, short setae. Pygidium shiny, widely convex, with scattered, shallow punctures and some minute setae; apical margin with 28 slender setae; basal margin narrow but complete at the middle, preceded by transverse sulcus. Pterosternum with long, dense, yellowish vestiture. Visible abdominal sternites 2° to 4° nearly convex at midline, shiny, with scattered fine punctures; sternite 5° convex, prominent, with patch of granulose punctures and scarce setae at middle; anal plate widely concave, granulose, with some erect, slender



Figures 34–39. *Phyllophaga* (*s.str.*) *nisuens* Saylor.

Figure 34. Male protarsal claw.

Figure 35. Genital capsule, lateral view (specimen from Guelatao, Oaxaca).

Figure 36. Same, dorsal view of distal half.

Figure 37. Same, distal view of paramera.

Figure 38. Genital capsule, lateral view (specimen from Concepción Papalo, Oaxaca).

Figure 39. Same, distal view of paramera. Scale lines: Fig. 34 = 0.5 mm; Figs. 35–39 = 1 mm.

setae, posterior border slightly thickened at sides and vaguely excavated at middle. Protibiae slightly shorter than protarsi (0.8:1), with two big teeth and one small tooth on external border, preapical spur long, straight, acute, longer than 2° protarsomerus. Mesotibiae with one oblique, strong, setiferous, transverse carina and short, setiferous tubercle toward proximal articulation on external side; upper apical spur straight, narrowed, 0.2 longer than lower spur. Metatibiae shorter than metatarsi (0.8:1), with one oblique, strong setiferous transverse carina and setiferous tubercle toward proximal articulation on external side; apical spurs articulated with the border, upper spur wide with rounded apex, shorter than 2° metatarsomerus, and 1.2 longer than the lower spur. Tarsomeres semicylindrical, elongated, with enlarged apex, some setae around the apex and some setae ventrally; metatarsomeres 2°–4° ventrally with two lines of stout setae. Tarsal claws symmetrical, similar on all legs, with large, acute tooth at middle of ventral border (Figs. 34). Genital capsule with long and sinuose paramera,

fused at their expanded, dorsal basis, apex narrowed, right angled turned, slightly compressed. Tectum convex. Aedeagus long and wide, with sclerotized tubular support, membranous apex densely covered with microscopic spines and claw-like, curved sclerotized structure at each side (Figs. 35–39). Length of genital capsule from apex of parameres to the border of basal piece: 4.5–5.2 mm. Total body length: 16.0–18.1 mm. Humeral width: 6.8–7.5 mm. *Female*: Unknown.

Biological Data.—Specimens of *P. nisuens* were collected at lights in pine and oak forests formed mainly by *Pinus pseudostrobus* Lindl., *P. leiophylla* Schl. et Cham. (Pinaceae), *Quercus urbani* Trel., *Q. conspersa* Benth., and *Q. castanea* Née (Fagaceae), located at an altitude of 2500–2630 m. Phenology: July (3), August (2). The other species of *Phyllophaga* flying at the same time and place was *P. (s.str.) papaloana* n.sp.

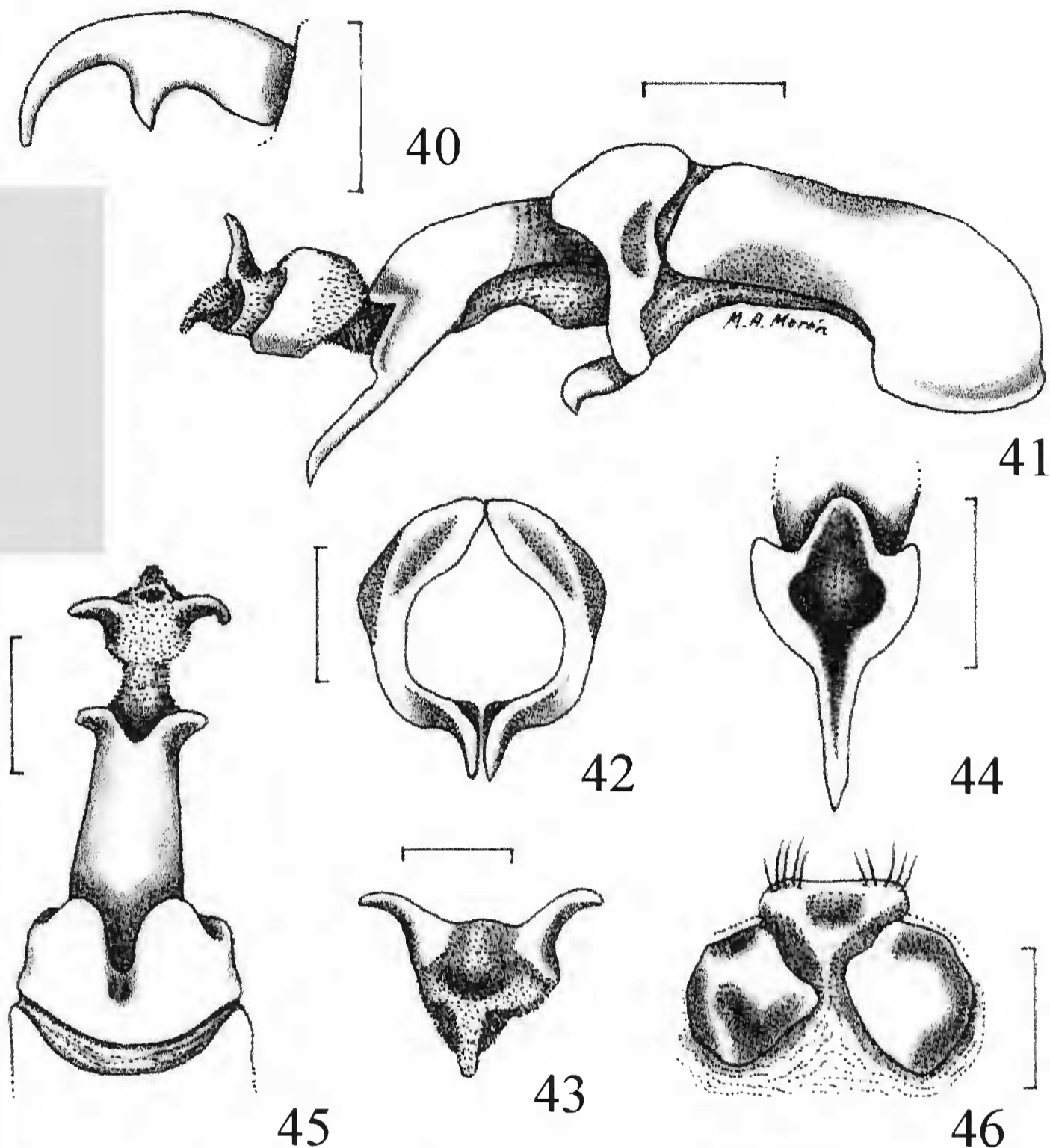
Remarks.—Type locality probably is “La Parada”, Oaxaca, located on the northern slope of mountains west of Cerro San Felipe, 2630 m, north of the city of Oaxaca (Selander & Vaurie 1962). Specimens from Guelatao (near 20 km NE of La Parada) are very similar to the type specimen, except by minor differences on ventral border of the apex of the paramera, which do not have the indentation seen in the type. Specimens from Concepción Papalo (near 40 km NNW of Guelatao) show some differences in the shape of dorsal projections at the base of the paramera, length of the ventral spine of the sclerotized support of aedeagus and width of apical projection of the paramera (Figs. 35–39). The localities cited above are placed around the Ixtlan upper valley (approx. 17°10′–17°25′ N, 96°30′–96°45′ W). Although there are minor differences in genitalia among type series, externally the specimens appear to be identical. *Phyllophaga nisuens* Saylor is not closely related to any described Mexican species, but probably will be included in a new group of species, placed near the group *blanchardi* (*sensu* Morón 1986). Shape of the clypeus, pronotal punctuation, form of last abdominal sternites and general structure of paramera suggest some relationship with species in the “*pubicauda*” complex, but the details and proportions of the aedeagus, form of tarsal claws and pygidial sculpture are quite different.

Etymology.—Derived from the Latin *nisus*, *nisuens*, meaning “striving” (Jaeger 1978).

PHYLLOPHAGA (PHYLLOPHAGA) TSAJUMIANA MORÓN, NEW SPECIES
(Figs. 40–46)

Types.—(Described from 13 males and 8 females). Holotype, male; MEXICO. Oaxaca, Concepción Papalo, 1 July 1998, 2375 m, G. Nogueira; deposited: M.A. Morón collection, Xalapa. Allotype, female, same data as holotype; deposited: M.A. Morón collection, Xalapa. Paratypes: same data as holotype (3 males, 2 females) (MXAL, IEXA); same data except, 9 July 1997, 2475 m (1 male, 2 females) (IEXA, CAS); same data except, 10 July 1997, 2275 m (3 males) (IEXA); same data except, 22 June 1998, 2300 m (1 female) (IEXA); same data except, 2 July 1998, 2330 m, (5 males, 2 females) (ZMHU, AHHC, MXAL, GNGC).

Holotype.—Male. Head, sterna and legs shiny reddish brown; pronotum, elytra, and pygidium dull reddish brown. Clypeus rounded, slightly bilobed, wider than long (3.5:1), anterior border shallowly and widely sinuated with margins scarcely elevated, surface convex, densely rugo-punctate, with scarce, short setae. Fronto-clypeal suture slightly sinuate, clearly impressed. Frons wider than long (2.3:1) convex, irregularly rugo-punctate, with some scattered, slender setae on all disk. Antenna 10



Figures 40–46. *Phyllophaga* (*s.str.*) *tsajumiana* Morón.

Figure 40. Male protarsal claw.

Figure 41. Holotype genital capsule, lateral view.

Figure 42. Paramera, distal view.

Figure 43. Apex of edeagus, distal view.

Figure 44. Apex of sclerotized support of aedeagus, dorso-distal view.

Figure 45. Genital capsule, dorsal view of distal half.

Figure 46. Female genital plates. Scale lines: Figs. 40, 43 = 0.5 mm; Figs. 41–42, 44–46 = 1 mm.

segmented, with 3 segmented club; lamellae 2× longer than the length of five preceding segments combined, segment 4° longer than segment 3, segments 6° and 7° wider than long, each one with acute process directed forward. Frons 5.1× wider than each eye dorsal diameter. Canthus curved and rounded, with 12–14 setae. Labrum bilobed, widely sinuate, with curved slender setae on borders. Mentum concave, polished, with transverse suture at middle and lateral slender setae, anterior border widely sinuate. Pronotum wider than long (1.7:1) and 2× wider than frons. Pronotal disk with small, round, shallow punctures irregularly distributed, separated by a distance of 2–6 diameters, pruinose iridescent, without setae; lateral borders strongly angulated, marginal bead shallowly crenulate, with

long, slender setae; anterior angles obtuse, rounded, not prominent; posterior angles widely obtuse, not prominent. Scutellum 1.5× wider than long, with 48 minute punctures. Elytron 2.8× longer than wide, finely rugo-punctate, pruinose iridescent, with scattered setae only near the lateral borders; epipleural border extended along complete margin, narrowed toward apex and provided with fringe of long setae on all length; humeral calla rounded, prominent; apical calla rounded. Metathoracic wings completely developed. Propygidium slightly shiny, rugo-punctate with many short setae. Pygidium dull, pruinose iridescent, widely convex, with scattered, shallow punctures and minute setae; apical margin with 28 slender setae; basal margin briefly interrupted at middle by shallow fovea. Pterosternum with long, dense, yellowish vestiture. Visible abdominal sternites 2° to 4° convex at midline, with small setiferous punctures; sternite 5° convex, prominent, with slightly depressed patch of granulose punctures and erect, short setae at middle; anal plate widely concave, finely rugose-granulose, with scattered erect setae, posterior border elevated and briefly sinuate at middle. Protibiae slightly shorter than protarsi (0.8:1), with two big teeth and one small tooth on external border, preapical spur long, straight, acute, longer than 2° protarsomerus. Mesotibiae with one oblique, strong, setiferous, transverse carina and acute, setiferous tubercle toward proximal articulation on external side; upper apical spur straight, narrowed, 0.3× longer than lower spur. Metatibiae shorter than metatarsi (0.8:1), with one oblique, strong setiferous transverse carina and setiferous tubercle toward proximal articulation on external side; apical spurs articulated with border, upper spur lanceolate, shorter than 2° metatarsomerus, and 1.3× longer than the curved, lower spur. Tarsomeres semicylindrical, elongated, with enlarged apex, some setae around the apex and some setae ventrally; metatarsomeres 2°–4° ventrally with two lines of stout setae. Tarsal claws symmetrical, similar on all legs, with acute tooth at middle of ventral border (Figs. 40). Genital capsule with long and sinuose paramera, fused at their expanded, dorsal basis; apex narrowed, right angled turned, slightly compressed. Tectum convex. Aedeagus long and wide, with sclerotized tubular support with arrow-shaped, acute apex; membranous apex densely covered with microscopic spines and claw-like, curved sclerotized structure at each side (Figs. 41–45). Length of genital capsule from apex of parameres to the border of basal piece: 3.8 mm. Total body length: 18.3 mm. Humeral width: 7.8 mm.

Allotype.—Female. Similar to holotype except as follows: clypeus and frons with punctuation coarser than in male; length of antennal club as long as preceding five segments; pygidial disk slightly upturned toward the apex, with preapical transverse rugosities; 5° sternite convex, densely punctate at middle; anal plate strongly convex, densely punctate. Ventral genital plates slightly asymmetrical, convex, rounded, without setae; dorsal genital plates fused, with distal border nearly straight, with rounded sides and some slender setae (Fig. 46). Total body length: 19.0 mm. Humeral width: 8.1 mm.

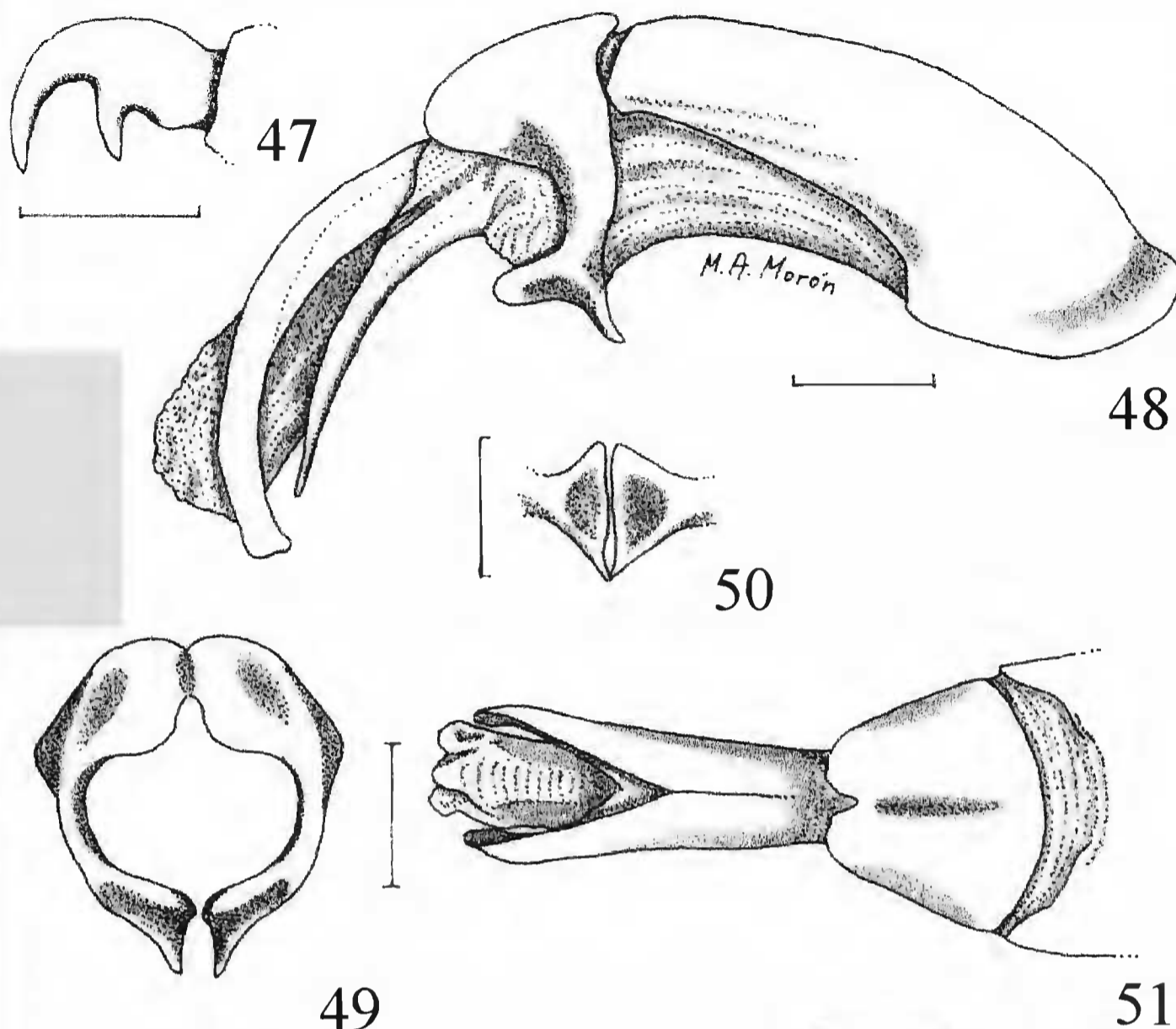
Type Locality.—Concepción Papalo municipality, state of Oaxaca, México (17°50'30" N; 96°52'50" W).

Variation.—Male paratypes are similar to holotype except as follows: density of punctures on the clypeus and frons is variable; reddish pruinose iridescent vestiture is more accentuated in some specimens than in others; crenulation on the lateral border of pronotum is less marked in some specimens; number of setae at the sides of each elytron is also different; total body length: 16.8–18.5 mm, humeral width: 7.0–8.1 mm. Female paratypes varies mainly in the intensity of elytral luster and growth of preapical transverse rugae of pygidium; total body length: 19.0–20.0 mm, humeral width 8.0–8.4 mm.

Biological Data.—Specimens of *P. tsajumiana* were collected at traps with Hg vapor lights in mixed pine-oak forests located at an altitude of 2275–2475 m, formed mainly by *Pinus leiophylla* Schl. et Cham., *P. oaxacana* (Martínez) Mirov. (Pinaceae), *Quercus conspersa* Benth., *Q. laurina* H. & B., *Q. castanea* Née (Fagaceae) and species of *Arbutus* (Ericaceae), *Symplocos* (Symplocaceae) and *Clethra* (Clethraceae). Phenology: June (1); July (18). The other species of *Phyllophaga* flying at the same time and place were *P. (s.str.) vetula* (Horn), *P. (s.str.) pubicauda* (Bates) and two undescribed species of *P. (Phytalus)*.

Remarks.—*Phyllophaga tsajumiana* is closely related to *P. nisuens* Saylor, but pruinose body vestiture, coarse head punctuation, and arrow-like shape of apex of aedeagus, are clearly different. With more data in the future both species will be included in a new species group.

Etymology.—Derived from old Chinanteca language, “*tsa-ju-jmi*”, meaning



Figures 47–51. *Phyllophaga* (*s.str.*) *papaloana* Morón.
 Figure 47. Male protarsal claw.
 Figure 48. Holotype genital capsule, lateral view.
 Figure 49. Paramera, distal view.
 Figure 50. Apex of paramera, ventral view.
 Figure 51. Genital capsule, dorsal view of distal half. Scale lines: Fig. 47 = 0.5 mm; Figs. 48–51 = 1 mm.

“people with old word”, and the name of the Indian people that actually live in the vicinity of the type locality of this species (Pardo, 1995).

PHYLLOPHAGA (PHYLLOPHAGA) PAPALOANA MORÓN, NEW SPECIES
 (Figs. 47–51)

Types.—(Described from 2 males). Holotype, male; MEXICO: OAXACA, Concepción Papalo, 23 June 1998, 2400 m, G. Nogueira; deposited: M.A. Morón collection, Xalapa. Paratype: same data as holotype except, 11 July 1997, 2500 m (1 male) (IEXA).

Holotype.—Male. Head shiny, dark reddish brown, pronotum elytra, pygidium, sterna and legs shiny reddish brown. Clypeus rounded, slightly bilobed, wider than long (3.9:1), anterior border brief and widely sinuated with margins scarcely elevated, surface slightly convex, dense and irregularly rugopunctate, without setae. Fronto-clypeal suture nearly straight, clearly impressed. Frons wider than long (2.3:1) convex, irregularly punctate, with some scattered, slender setae toward ocular borders. Antenna 10 segmented, with 3 segmented club; lamellae 1.2× longer than the length of five preceding segments

combined, segment 4° or 5° longer than segment 3, segments 6° and 7° wider than long, each one with short, acute process directed forward. Frons 5× wider than each eye dorsal diameter. Canthus short, curved and rounded, with 8 setae. Labrum bilobed, deeply notched, with curved slender setae on borders. Mentum concave, polished with lateral slender setae, anterior border widely notched. Pronotum wider than long (1.8:1) and 2× wider than frons. Pronotal disk with small, round punctures irregularly distributed, separated by a distance of 1–2 diameters, without setae; lateral borders strongly angulated, marginal bead briefly crenulate, with long, slender setae; anterior angles obtuse, rounded, not prominent; posterior angles widely obtuse, not prominent. Scutellum 1.8× wider than long, with 34 small punctures. Elytron 3× longer than wide, moderately rugo-punctate, with scattered setae only near lateral borders; epipleural border extended along complete margin, narrowed toward apex and provided with many long setae scattered on all length; humeral calla rounded, prominent; apical calla rounded. Metathoracic wings completely developed. Propygidium slightly shiny, with scattered, fine punctures, without macroscopic setae. Pygidium shiny, widely convex, slightly rugose, with sparse, shallow punctures and some minute setae; apical margin with 26 slender setae; basal margin wide and vaguely interrupted at middle, represented by shallow, punctate sulcus. Pterosternum with long, dense, yellowish vestiture. Visible abdominal sternites 2° to 4° convex at midline, with small setiferous punctures; sternite 5° convex, prominent, with poorly defined patch of granulose punctures and some, short setae at middle; anal plate slightly concave, finely rugose-granulose, with some scattered, erect setae, posterior border slightly elevated and briefly sinuate at middle. Protibiae nearly as long as protarsi (0.95:1), with two big teeth and one small tooth on external border, preapical spur long, straight, acute, slightly longer than 2° protarsomerus. Mesotibiae with one oblique, strong, setiferous, transverse carina and one setiferous point toward proximal articulation on external side; upper apical spur straight, narrowed, 0.2× longer than lower spur. Metatibiae nearly as long as metatarsi (0.95:1), with one oblique, strong setiferous transverse carina on external side; apical spurs articulated with border, upper spur lanceolate, curved, slightly shorter than 2° metatarsomerus, and 1.5× longer than curved, apical rounded, lower spur. Tarsomeres semicylindrical, elongated, with enlarged apex, some setae around the apex and some setae ventrally; metatarsomeres 2°–4° ventrally with two lines of stout setae. Tarsal claws symmetrical, similar on all legs, with curved, acute tooth at middle of ventral border (Figs. 47). Genital capsule with long and deeply sinuose paramera, fused at their expanded, dorsal basis; with preapical, compressed and expanded process (Fig. 50). Tectum convex. Aedeagus long and wide, with sclerotized, curved bar support, with rounded apex; membranous apex covered with microscopic spines (Figs. 48–51). Length of genital capsule from apex of parameres to the border of basal piece: 5.4 mm. Total body length: 20.0 mm. Humeral width: 7.9 mm. *Female*. Unknown.

Type Locality.—Concepción Papalo municipality, state of Oaxaca, México (17°50'30" N; 96°52'50" W).

Variation.—Male paratype is similar to holotype except as follows: body color slightly light; pygidial disk with slight longitudinal rugosities; total body length: 19.5 mm, humeral width: 8.01 mm.

Biological Data.—Specimens of *P. papaloana* were collected at traps with Hg vapor lights in mixed pine-oak forests located at an altitude of 2400–2500 m, formed mainly by *Pinus leiophylla* Schl. et Cham., *P. oaxacana* (Martínez) Mirov. (Pinaceae), *Quercus laurina* H. & B. (Fagaceae) and species of *Arbutus* (Ericaceae) and *Clethra* (Clethraceae). Phenology: June (1); July (1). The other species of *Phyllophaga* flying at the same time and place were *P. (s.str.) punctulicollis* (Bates), *P. (s.str.) nisuens* Saylor and *P. (Phytalus) lineata* (Bates).

Remarks.—*Phyllophaga papaloana* is related to *P. nisuens* Saylor, and *P. tsajumiana* Morón but details of the head, pronotal and elytral punctuation, microstructure of last abdominal sternites, tarsal claw shape and general design of the paramera and aedeagus, are very different. Male genital structure suggest some relationship with species in the “*pubicauda*” complex, but details of aedeagus, form of tarsal claws and pronotal sculpture are different.

Etymology.—Derived from Nahuatl language name of type locality, *papalotl*, *Papalo*, meaning “butterfly” (Simeón 1978).

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